

Marking Scheme_v1

(Erratum: v1 used in Chem/Bio and Bio/Chem, **not** the final edition of P1))

BSS/ 2019 Preliminary Examination/ 4E/5N ScChem

Paper 1

1 D	2 A	3 D	4 A	5 C	6 C	7 B	8 B	9 B	10 A
11 C	12 B	13 D	14 B	15 C	16 A	17 C	18 C	19 C	20 D

Marking Scheme

BSS/ 2019 Preliminary Examination/ 4E/5N ScChem

Paper 3, Section A

1a B [1]

b A [1]

c B [1]

d C [1]

2a It is an atom of an element with the same proton number but **different** number of neutrons [1]

b fluorine -21 and neon-22 ; both correct [1]

c $^{12}_6\text{C}$ [1]

d Both have two valence electrons [1]

e iodine-129 [1] ; don't penalise if only ' iodine' written

f neon has a full (or complete) structure on the outer electron shell that ~~makes~~ it stable [1]

3a ionic ~~bond~~ [1]

bi pass the gas into limewater[1]; a white ppt will form [1]

ii correct bonding between atoms of one carbon and two oxygen elements [1]

correct electronic configurations for 2 oxygen and 1 carbon atoms [1]

4.

metal A	metal B	liquid X	liquid Y	observation
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iron	steel	dilute hydrochloric acid	dilute hydrochloric acid	sphere A heavier/ both have same mass / sphere B heavier
zinc	zinc	dilute hydrochloric acid	water	sphere A heavier/ both have same mass / sphere B heavier
copper	zinc	dilute hydrochloric acid	dilute hydrochloric acid	sphere A heavier/ both have same mass / sphere B heavier
carbon	carbon	dilute hydrochloric acid	water	sphere A heavier/ both have same mass / sphere B heavier

[4]

5ai F and G [1]

ii no, because different proton number [1]

b F [1]

c G [1]

6a **Q:** carbon

R : carbon monoxide

S: iron

T: sulfuric acid

U: iron(II) sulfate

V: barium sulfate [1] each

b.` aqueous ammonia or ammonia solution [1]

c. $\text{Fe}^{2+}(\text{aq}) + 2\text{OH}^{-}(\text{aq}) \rightarrow \text{Fe}(\text{OH})_2(\text{s})$ [1] [zero if states not given]

7a fractional distillation [1]

bi fermentation [1]

ii 37°C; yeast [1]

- c correct structural formula of ethanol [1]
- di ethanol in wine changes to form ethanoic acid. [1]
oxidation of ethanol occurs in the presence of air and bacteria [1]
- ii Put litmus paper (or Universal indicator) [1]
 Blue litmus turns red [1] (UI turns from green to yellow)
- 8a ammonia [1]
- b labelled diagram of gas syringe [1]
 Diagram showing tight-fitting plunger that could move within graduated vessel [1]
- c raise temperature; reduce size of ammonium chloride **solid**; **increase** concentration of potassium hydroxide
 [2] for 3 correct; [1] for 1 or 2 correct
- d no reaction; or no gas is formed [1]

Section B



Correct symbols; balanced equation; states
 [2] for all 3 correct; [1] for 2 or less

- b (i) number of mole of CaCO_3 = $10\text{g} / 100$
 = 0.1 mol [1]
- (ii) number of mol of HCl = 0.2 mol [1]; allow ecf from (i)
- (iii) volume of HCl = $0.2 / 1$
 = 0.2 dm^3 [1]; -1m for no unit; allow ecf from (ii)
- ci 70 cm^3 [1]; -1m for no unit
- ii between 4.6 and 4.8 min [1]
- iii $50 / 1.5 = 33.33 \text{ cm}^3$ [1]
 = $33.3 \text{ cm}^3 / \text{min}$ [3sf]
- iv concentration of the acid decreases as the acid is used up/ less particles within the same volume [1] less effective collisions taking place per unit time [1]
- 10a (i) oxidation number of copper was zero before reaction [1]
 (ii) oxidation number of copper was +2 after reaction [1]
 (iii) copper is oxidised as its oxidation number increases. [1]
- b a dark blue solution is seen [1]

- ci copper (II) oxide; copper (II) hydroxide [1]
- ii -add excess base to nitric acid
 -filter to remove excess base as residue
 -heat to saturation point
 -cool
 -decant/ filter / scoop up crystals with filter papers
 - dry between filter papers [5] for any 5 ans; give marks even if prior steps are skipped
- 11a It is a compound which consists of carbon and hydrogen atoms only [1]
- bi brown aqueous bromine becomes colourless [1]
- ii bromine remains brown [1]
- iii sample one is an alkene but sample two is an alkane [1]
- c myrcene comprises non-metals only and so it is a covalent compound. [1]
 presence of weak intermolecular forces of attraction [1]
 little energy required; low melting point and therefore a liquid at room temp [1]
- di high temp; aluminium oxide or silicon dioxide as catalyst [1]
- ii hydrogen [1]
- iii ethene [1]
- iv [1]



